installation and user's guide

hp StorageWorks NAS Data Path Manager

installation and user's guide

Edition: March 2003

Part Number: A7423-96001

© Hewlett-Packard Company, 2003.

Hewlett-Packard Company makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

This document contains proprietary information, which is protected by copyright. No part of this document may be photocopied, reproduced, or translated into another language without the prior written consent of Hewlett-Packard. The information contained in this document is subject to change without notice.

Compaq Computer Corporation is a wholly-owned subsidiary of Hewlett-Packard Company.

Java® and all Java-based marks are trademarks or registered trademarks of Sun Microsystems, Inc.

Microsoft®, Windows®, and Windows NT® are trademarks of Microsoft Corporation.

UNIX® is a registered trademark of The Open Group.

All other product names mentioned herein may be trademarks of their respective companies.

Hewlett-Packard Company shall not be liable for technical or editorial errors or omissions contained herein. The information is provided “as is” without warranty of any kind and is subject to change without notice. The warranties for Hewlett-Packard Company products are set forth in the express limited warranty statements for such products. Nothing herein should be construed as constituting an additional warranty.

Printed in the U.S.A.

hp StorageWorks NAS Data Path Manager Installation and User’s Guide
Edition March 2003
Part Number: A7423-96001

contents

About this Guide 5
Intended Audience 5
Related Documentation 5
Document Conventions 6
Getting Help 6
HP Technical Support 6
HP Storage Website 7
HP Authorized Reseller 7

1 NAS Data Path Manager 9
Product Overview 9
Graphical User Interface 10
System Requirements 10
Product Components 11
Guide Overview 11
Data Path Concepts 12
Data Path Load Balancing 13
Data Path Failover 14
Automatic Failback 14
Install NAS Data Path Manager 15
Prerequisites 15
Install the Software 15
Enable and Disable the Software 15
Monitor Data Paths 17
Use Performance Monitor to Monitor HBAs 17
View and Change Performance Monitor Settings 17
Observe Data Path Performance 19
View Volume Groups for Path Information 21
View Volume Group Information in Tree View 21
Create a New Volume Group 24

Edit Selected Volume Group 24
Delete Selected Volume Group 25
Test Selected Path 25
Repair Volume Group 25
Reset LUN Paths to Factory Settings 26
Refresh the View 26
View Volume Group Information in Table View 26
Decide Whether to Manage the Data Paths 27
Manage the Data Paths 28
Learn to Perform Basic Data Path Manager Tasks 28
Accept the Default Settings 28
Assign a LUN to a storage array 29
Take a path off-line or put it back on-line 29
Change path behavior (from alternate to preferred or vice-versa) 29
Add Hardware 30
Remove Hardware 30
Optimize Path Performance 31
Troubleshoot Failed Paths 31
Restore to Default Settings 33
Recover from a Disaster 33

A Text API Commands for NAS Data Path Manager 35

Glossary 37

Index 39

about this guide

This installation and user's guide provides information to help you:

- Install NAS Data Path Manager software on your HP StorageWorks NAS 8000 system.
- Understand data path management concepts.
- Monitor and manage data paths on your NAS 8000.
- Reinstall and reconfigure NAS Data Path Manager after system Disaster Recovery.

Intended Audience

This guide is written for system administrators, technicians, and HP on-site service representatives who are experienced with HP StorageWorks NAS 8000 systems.

Related Documentation

In addition to this guide, HP provides corresponding information:

- HP StorageWorks NAS 8000 on-line help system.
- HP StorageWorks NAS 8000 1.6.0 Release Notes.

Document Conventions

This document uses the following formatting conventions included in Table 1.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Blue text: Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	*Italics*
User input, command and directory names, and system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase monospace font unless they are case sensitive
Variables	`<monospace, italic font>`
Website addresses	Blue, underlined sans serif font text: http://www.hp.com

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website: http://www.hp.com/support/nas8000.

HP Technical Support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Note: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support: http://thenew.hp.com/country/us/eng/support.html.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers (NAS 8000 and arrays in question)

- Product model names and numbers
- Applicable error messages
- Operating system type and revision level (from Command View NAS Identity page)
- Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product, as well as the latest drivers. Access storage at:
http://thenew.hp.com/country/us/eng/prodserv/storage.html.

From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP website for locations and telephone numbers: http://www.hp.com.

NAS Data Path Manager

1

Product Overview

HP StorageWorks NAS Data Path Manager is an optional software product you can purchase for the HP StorageWorks NAS 8000. It provides automatic path load balancing and failover for NAS 8000 servers configured with multiple host bus adapters (HBAs). The software allows you to customize your path settings, as needed, to obtain optimum performance from your storage system. In addition, Data Path Manager provides failover capability should all of the load balancing (or optimal) paths fail.

HP NAS Data Path Manager provides:

- Faster performance through dynamic load balancing over multiple paths from the HBAs to the Storage controllers.
- Automatic data path failover to an alternate path when a preferred path fails.

Using dynamic load balancing, NAS Data Path Manager balances the flow of data through multiple paths to a specific storage location using a least-used algorithm. It detects multiple paths to each device, identified by a logical unit number (LUN), and divides the data load among the designated preferred paths. See Data Path Concepts on page 12.

NAS Data Path Manager failover allows access to storage to continue uninterrupted, in the event of a failure of all preferred paths, by using available alternate paths.

Note: Data Path Failover and failover packages are different NAS 8000 features.

- Data Path Failover is the ability of your system to use alternate fibre-channel paths to get information to your storage in case all of the preferred paths fail. Data Path Failover can be installed and used on any NAS 8000 (version 1.6.0 or later) high availability (HA) or non-HA system, with the correct firmware revision. Please contact your HP Service Representative for firmware information or updates.
- Failover packages appear only on NAS 8000 systems with high availability (HA). Using failover packages, your system can transfer control of data, per failover package, to a different NAS 8000 server if one server fails. For more information on failover packages, please see the NAS 8000 User's Guide.

Graphical User Interface

Once NAS Data Path Manager is installed on a NAS 8000 server, additional items will appear in Command View NAS, the NAS 8000 graphical user interface. This allows the administrator to view and manage NAS Data Path Manager functionality on the NAS 8000 using the same interface used to perform all other storage management tasks.

System Requirements

NAS Data Path Manager has the following system requirements.

- HP StorageWorks NAS 8000 system, (hpNasOs) version 1.6.0 or later
- Fibre-channel storage devices
- Host bus adapters (HBAs) connected to your fibre-channel storage devices
- HBA firmware v3.90a7 or later
- VA710x, VA740x, VA741x, XP, EMA, and/or EVA storage arrays

Product Components

The NAS Data Path Manager product includes:

- HP NAS Data Path Manager Installation and User's Guide
- NAS Data Path Manager Software CD
- Software License Agreement

Note: This guide is also on the NAS 8000 Documentation CD in PDF format.

Guide Overview

This guide contains the following sections:

Section	Information
Product Overview	Introduction to the features of NAS Data Path Manager
Data Path Concepts	Key concepts for understanding the software uses and capabilities
Install NAS Data Path Manager	Information needed to install and enable NAS Data Path Manager
Monitor Data Paths	Tasks to perform to begin using NAS Data Path Manager
Manage the Data Paths	Tasks to customize data paths in different conditions, to reset data paths to the default values, and to recover from a disaster.
Text API Commands for NAS Data Path Manager	Text API commands you will need to install, enable, disable, and restore NAS Data Path Manager
Glossary	Definitions of important terms.

Data Path Concepts

Data paths exist wherever there are physical connections from an initiator (a NAS server HBA) to a target (an array controller). Data Path Manager manages traffic patterns among all available paths between the NAS server HBAs and the LUNs in your arrays.

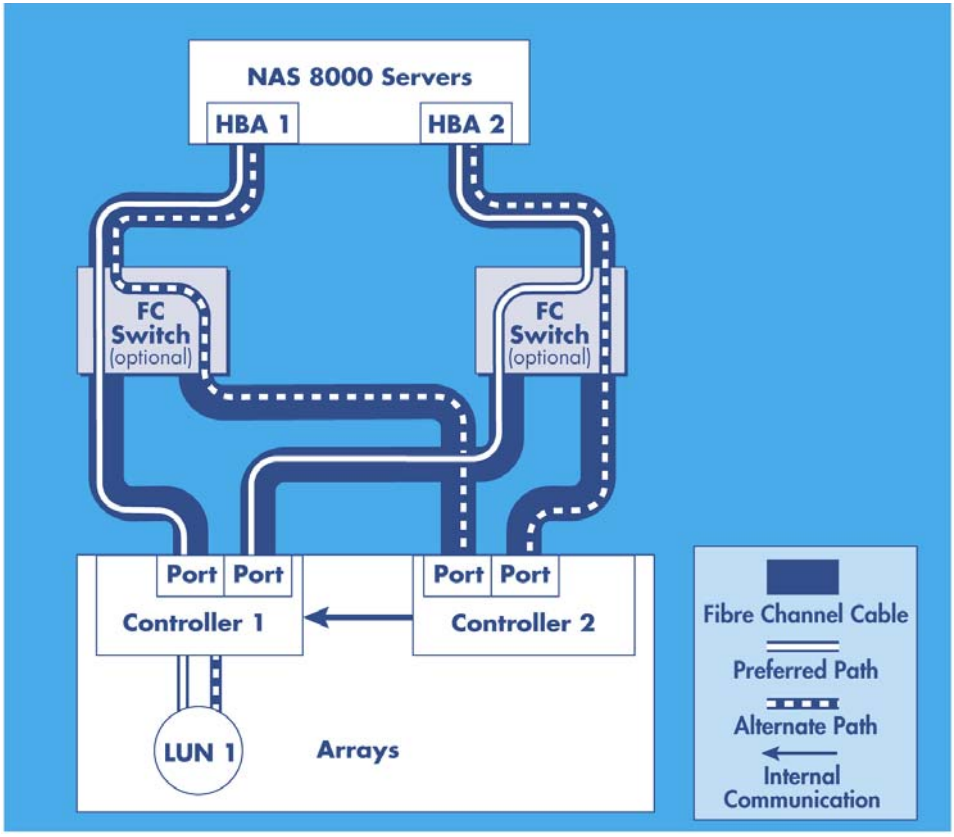


Figure 1: Preferred (optimal) and Alternate (non-optimal) Paths

Each path is comprised of the HBA, controller, and any necessary networking hardware. NAS Data Path Manager evaluates the paths and determines which are considered optimal and which are non-optimal. This is determined by looking at the overhead associated with transferring data from the NAS 8000 to a specific LUN on an associated storage device.

As a general rule, when a non-optimal path is used, the request is going from one HBA through a controller that communicates with the controller of the target LUN. Therefore, the data request goes through two controllers to get to the specific LUN, instead of just one. (This is true for all except XP controllers, for which all paths are considered optimal.) See paths to Controller 2 in Figure 1 on page 12. The overhead is the slight increase in time required for the first controller to talk to the second controller. In reality the time that it takes is quite small for each data transfer; however, it becomes significant when you multiply the extra time by the number of transfers requested.

By default, NAS Data Path Manager assigns optimal paths as preferred paths, and non-optimal paths as alternate paths. For XP arrays and some VA arrays, there are no non-optimal paths. In such a case, no paths are assigned as failover paths by default, so you must set them manually.

Note: A path can be either preferred or alternate, but not both.

Data Path Load Balancing

Load balancing allows the greatest throughput of data from an HBA to a LUN by using all available preferred paths, instead of just a single path. This allows users to have faster access to the data on the specified LUN. Without load balancing, you are restricted to sending data over a single path, even when it is more efficient to send data over multiple data paths. Lengthy wait times can occur as all data requests queue up on the same path.

If one preferred data path fails, NAS Data Path Manager drops the failed path out of the preferred path rotation, and continues to transfer data through other preferred data paths without any loss of data. The switch-over is completely transparent to applications, so normal operation continues without downtime.

All path events are logged in an Event Summary, allowing the administrator to investigate and repair failed paths. A path monitoring daemon checks the health and status of all paths every 10 minutes. If a failed path has been repaired, it will be used again, according to the current load balancing policy.

Note: HA Package failover does not occur unless all preferred and alternate paths on a single head fail.

Data Path Failover

Data path failover occurs when all designated preferred paths fail between the NAS server and its storage device. NAS Data Path Manager splits data transfers among “good” (non-failed) preferred paths in a least-used pattern, as long as there are functioning preferred paths. If all preferred paths fail, NAS Data Path Manager directs the traffic to a designated alternate path so that normal operations continue without interruption.

Without data path failover, if all preferred paths fail, there would be no communication between the server and the LUN, and normal operations would cease until any path is restored.

Note: For maximum data protection and uninterrupted service, NAS Data Path Manager and High Availability configuration work together to provide the greatest protection and stability. In an HA configuration where all preferred and alternate paths have failed, the Failover Package will be moved to the second NAS server following the HA configuration settings that the administrator has set up.

To disable data path failover, either disable the authorization to use the software (see Enable and Disable the Software on page 15).

Automatic Failback

When a preferred path fails, the path is not used until it is restored. Automatic Failback restores the path to use after it is back in operation. The operating system tests the failed path to see if it is restored before it can be used again. Testing and restoring the path can take up to 10 minutes.

Install NAS Data Path Manager

Prerequisites

See System Requirements on page 10.

Install the Software

Use the NAS Data Path Manager software CD and the command line interface to install NAS Data Path Manager.

1. On the NAS 8000 server, insert the CD into the server's CD-ROM drive.
2. On a computer on the network, access the command line interface:
   a. On an MS Windows system, Select **Start > Run**. (This step is not necessary for UNIX/Linux systems.)
   b. Execute:

      ```
      telnet <nas_8000_hostname_or_IP_address>
      ```

   c. Log in as `admin` and use a password, if prompted.
3. Execute the following commands.

   ```
   installSystemPackage
      cdrom://hpNasOs-DataPathManager-1.0-0.i386.rpm
   installSystemPackage
      cdrom://hpNasOs-DataPathManager-authorize-1.0-
      0.i386.rpm
   ```

4. Remove the CD from the CD-ROM drive.

   The software is installed, but not yet enabled.

Enable and Disable the Software

Enable and disable NAS Data Path Manager from Command View NAS.

1. If you had a browser open, close and re-open it, so that it finds the DPM software.
2. Select the **Applications** tab.
3. Select **NAS Data Path Manager**.

4. Select **Actions > Enable/Disable Application**.
5. Click **OK**.

The sample configuration, below, shows a multi-server, multi-array system using NAS Data Path Manager. Recommended connections from the fibre channel switches to the arrays are represented by solid lines; optional connections are represented by dashed lines.

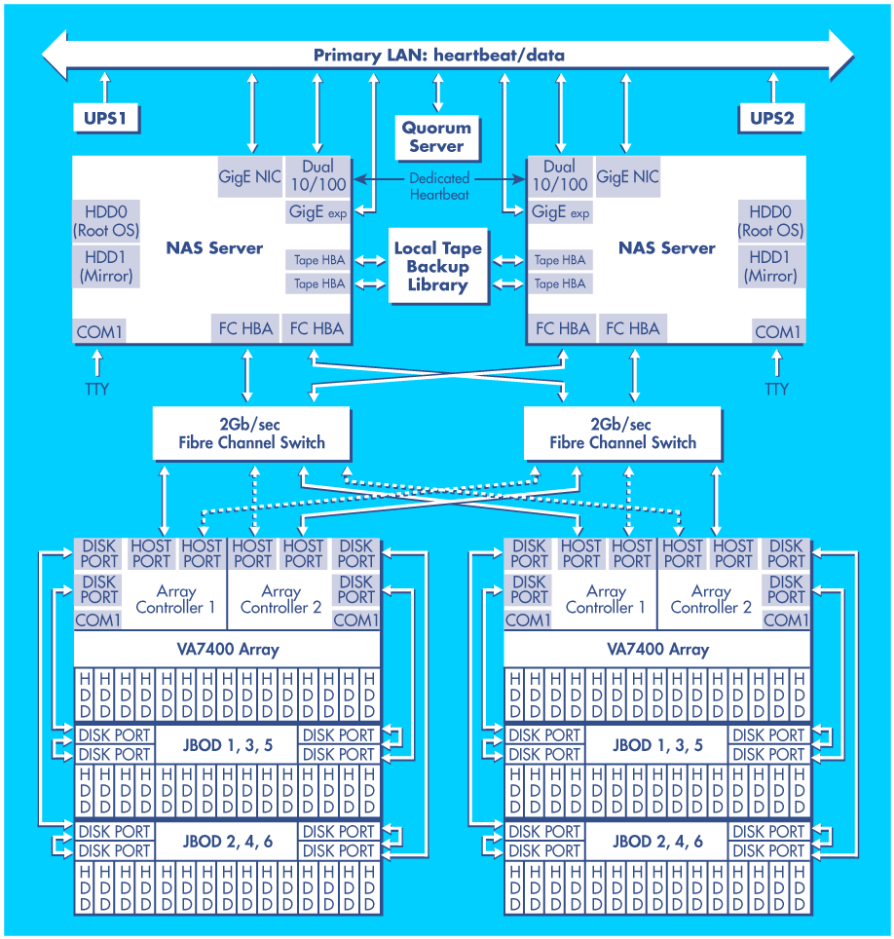


Figure 2: Sample configuration using NAS Data Path Manager on a NAS 8000 high availability system

Monitor Data Paths

Check path configuration and performance using several methods.

- Use Performance Monitor to Monitor HBAs
- View Volume Groups for Path Information

These topics are discussed in detail below.

Use Performance Monitor to Monitor HBAs

Use HP NAS 8000 Performance Monitor to:

- View and Change Performance Monitor Settings.
- Observe Data Path Performance.

Note: Performance Monitor can show HBA, NFS, and CPU performance, depending on what you enable. Information presented here is for HBA monitoring only. NFS and CPU performance monitoring are discussed in the HP NAS 8000 User's Guide.

View and Change Performance Monitor Settings

Performance Monitor defaults to the disabled state. Metrics are not received and no performance history is recorded. You can enable Performance Monitor to receive data every 5 seconds for a particular HBA, and choose whether to maintain the performance history for an enabled HBA.

To access and enable Performance Monitor:

1. From Command View NAS menu bar, select **Tools > Performance Monitor**. This opens a new window.
2. Select **HBAs** (not a specific HBA) from the tree in the left panel. (Figure 3 shows the Performance Monitor window and a sample tree.)

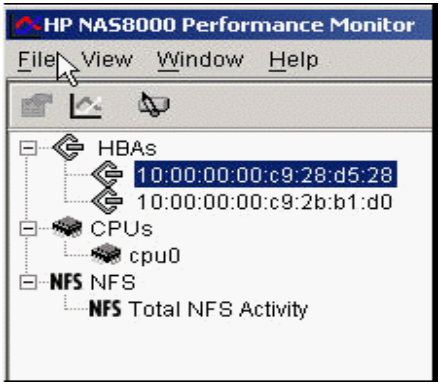
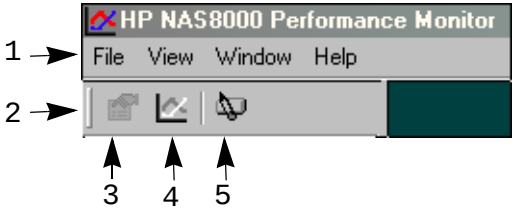


Figure 3: Performance Monitor window



1. Performance Monitor Menu Bar
2. Metric Actions Toolbar
3. Enable/Disable Monitor
4. Open Chart for Selected Item
5. Clear Monitor History on Server

Figure 4: Performance Monitor Window Menu, Metric Actions Toolbar, and Icons

3. Click the **Enable/Disable Monitor** icon on the Metric Actions Toolbar to display the **Configure Metrics** window.
4. In the **Enable Monitoring** box:
   a. Check the box to enable monitoring.
   b. To **Enable Historical Data**, check that box as well. (This option is not available unless monitoring is enabled.)
   c. Click **OK** to put these settings into effect.

You can also access the Performance Monitor Settings dialog box to change the settings by either of the following methods.

- From Command View NAS, select **Configuration > Alerts/Logging > Performance Monitor Settings**, then **Actions > Edit Performance Monitor Settings** to view and change the monitoring settings.
- From Command View NAS, select **Configuration > Configuration Wizard > Actions > Launch Wizard**. Then select **Next** to get the **What do you want to configure?** dialog box. Select only the **Alert and Monitor Settings** box, then select **Next** until you get to the **Performance Monitor Settings** dialog box. Make your enable/disable selections here.

To clear the monitoring history of an HBA, follow these steps.

1. From Command View NAS, select **Tools > Performance Monitor** from the menu bar.
2. From the item tree, select the HBA you wish to clear.
3. Select the **Clear Monitor History on Server** icon on the Metric Actions Toolbar.

Observe Data Path Performance

Once the HBA metrics have been enabled, you can use Performance Monitor to observe data path performance for the specified HBA(s).

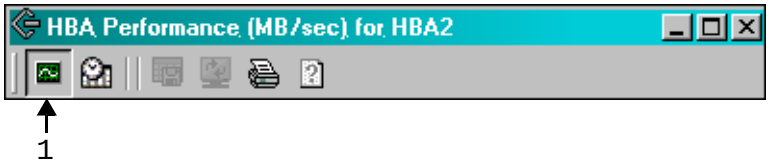
1. Launch Performance Monitor by one of the following methods.
   - From Command View NAS, select **Tools > Performance Monitor** from the menu bar. This opens a new window.
   - From the **Configuration** tab under **Alerts/Logging,** select **Performance Monitor Settings > Actions > Open Performance Monitor**. This opens a new window.
   - From the **Status** tab, select **Actions > Performance Monitor**.
2. Select the HBA you wish to view from the tree in the left panel.
3. Either double-click the HBA name or select the **Open Chart for Selected Item** icon. This icon is available by right-clicking the HBA name, and is also available on the Metric Actions Toolbar.

   You can view data for several HBAs at a time by repeating this step for each HBA you wish to observe.

Note: Since Performance Monitor runs in a separate window, you can keep it open while you are making changes to your data path settings in Command View NAS, so you can view the impact of a change without exiting the path management session.

You can view each chart in two modes; showing either real-time or historical data.

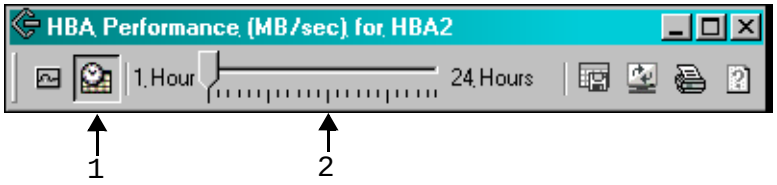
View Real-time chart is the default view. This view shows the read rate and write rate (MB/sec) of the specified HBA. Measurements are taken every 5 seconds, and appear on the chart as they are received. The **View Real-time chart** icon appears on the Chart Toolbar. You can also switch to this mode from the Performance Monitor Menu Bar by selecting **View > Real-time Chart**.



1. Real-time Chart icon

Figure 5: Real-time Chart Toolbar

View Historical chart allows you to see the HBA read rate and write rate for the last 1 to 24 hours. Select the number of hours to display by using the slider in the HBA Performance chart tool bar. Use the scroll bar at the bottom of the chart to see all of the data for the selected time period. The **View Historical chart** icon is on the Chart Toolbar. You can also switch to this mode from the Performance Monitor Menu Bar by selecting **View > Historical Chart**.



1. Historical Chart icon
2. Time interval selection Slider

Figure 6: Historical Chart Toolbar

For instructions on printing charts, exporting chart data, or getting help on reading charts, see “Performance Monitoring” in the *HP NAS 8000 User’s Guide*.

View Volume Groups for Path Information

The View Volume Groups window allows you to manage the relationship between system LUNs and volume groups to improve performance. You can:

- View Volume Group Information in Tree View
- Create a New Volume Group
- Edit Selected Volume Group
- Delete Selected Volume Group
- Test Selected Path
- Repair Volume Group
- Reset LUN Paths to Factory Settings
- Refresh the View
- View Volume Group Information in Table View

View Volume Group Information in Tree View

Detailed path information is available in the tree view. From the **Storage** tab, select **Volume Groups**, then the tree view (second icon to the right of **Actions**).

The tree view shows the following information for each volume group:

- The list of volume groups, packages (HA systems only), LUNs, and paths
- The current state of packages, volume groups, and preferred paths. (LUNs do not have a state.)
  - Package states (HA systems only) are Running, Stopped, Failed Over, Unknown, or Inactive.

    If the package is being used by another node, you will see **Running (on <node name>)** as the package state. To edit any volume group, LUN, or path on that package, you must stop the package and make the package local to your node.
  - Volume group states are Active or Inactive
  - Preferred path states are Active, Available, Failed, or Unknown
- Current mode of the paths: Preferred, Alternate, Preferred Off-line, or Alternate Off-line
- Path initiator's (HBA's) world wide name
- Path target's (storage controller's) world wide name

In the tree view, the volume groups are listed alphabetically by name unless you are on an HA system. On an HA system, the tree view displays package names first (listed alphabetically), then all volume groups that are not associated with a package.

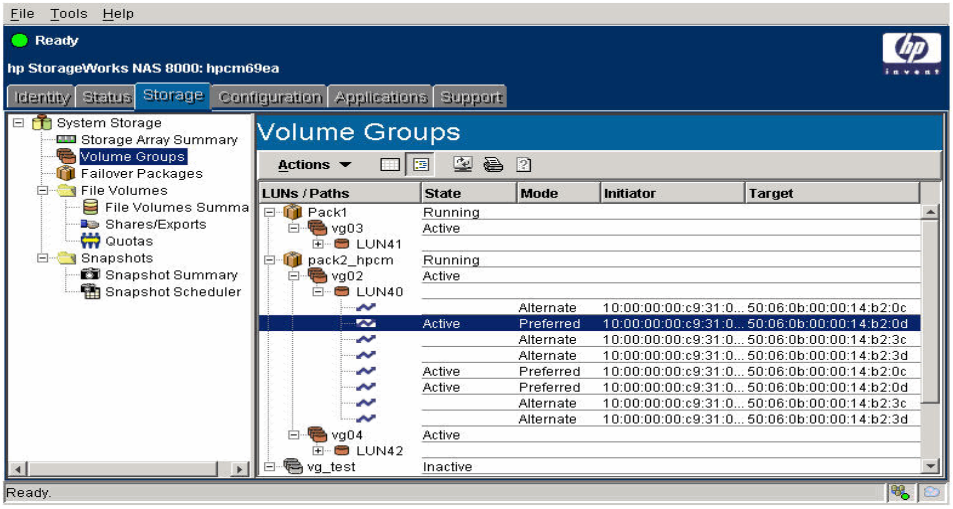


Figure 7: View volume group information in tree view

Note: Each initiator (HBA) and target (controller) is identified by its world wide name (WWN) in the Volume Groups table. A WWN is a unique alpha-numeric identifier for hardware.

The relationship between the path modes and states provides you with important status information in a simplified way. Some of this information is self-explanatory; other mode/state combinations require explanation.

The following table explains these relationships.

Table 2: Path Modes and States Explained

Situation	Mode	State	Action
All paths are in good condition	Preferred Alternate	Active *	Information is distributed (load is balanced) among the active preferred paths, alternate paths are available but not being used.
Preferred path fails	Preferred Off-line	Failed	You should repair the path as soon as possible. When it is repaired it will be used for the load balancing algorithm.
Preferred path is set to off-line by the user	Preferred Off-line	Failed	You have taken the path off-line, so the path does not necessarily need repair. To restore the path, you must put it back on-line. The path then returns to it's previous mode and state.
Alternate path fails	Alternate	*	You must repair the failed path. Automatic Failback will then restore the path so it can be used for failover.
Alternate path is set to off-line by the user	Alternate Off-line	*	You have taken the path off-line, so the path does not necessarily need repair. To restore the path, you must put it back on-line. The path then returns to it's previous mode and state.
Preferred path(s) have failed over to an alternate path	Alternate	Active	Repair (or restore) the preferred path(s) so normal operations will not be interrupted if the alternate path fails

* The state of alternate paths is not shown in this table, unless that path is currently being used. You can find the current state of any path by selecting the path, then selecting **Actions > Test Selected Path**. The test will take up to two minutes, then a dialog box will report the status of the path.

Create a New Volume Group

To create a new volume group:

1. In Command View NAS, click the **Storage** tab.
2. Navigate to **Volume Groups.**
3. Select **Actions > Create New Volume Group** to bring up the Create New Volume Group dialog box.
4. Enter a name for your new volume group in the **Volume Group Name** field.
5. Select an appropriate LUN from the **Available LUNs** list and click **OK** to move the name to the **Allocated LUNs** list.
6. Continue to select and move LUNs, as appropriate.
7. Click **OK** to create the volume group and return to the Volume Groups table view.

Edit Selected Volume Group

To edit an existing volume group:

1. In Command View NAS, select the **Storage** tab
2. Select **Volume Groups**, then the View Volume Groups icon (first icon to the right of **Actions**) to use the table view.
3. Select the volume group you want to rename by clicking the row.
4. Select **Actions > Edit Selected Volume Group** to bring up the Edit Volume Group dialog box.
   - To change the volume group name, type in the corrected name in the **Volume Group Name** field.
   - To add a LUN, select it from the **Available LUNs** field, click the **Add** button. The LUN will move to the **Allocated LUNs** field.

     To change your mind about adding a LUN, select it from the **Allocated LUNs** field, click the **Remove** button. The LUN will move back to the **Available LUNs** field.

Note: The **Remove** button will be inactive if there is only one array per volume group. Also, you can not remove LUNs that are already part of the volume group.

---

5. Click **OK** to save changes and exit the dialog box.

Delete Selected Volume Group

To delete a volume group:

1. In Command View NAS, select the **Storage** tab, then select **Volume Groups**. Use either the Table or Tree view for this action.
2. Select the volume group to delete.
3. Select **Actions > Delete Selected Volume Group**.
   - If the Volume Group contains data, an error dialog box will appear, explaining what action must be taken before you can delete the volume group. Click **OK** to exit the dialog box.
   - If the volume group is empty, the **Confirm Volume Group Delete** dialog box will appear. Click **OK** to delete the volume group and exit the dialog box.

Test Selected Path

At any time, you can test a specific path to find out whether it is working or failed.

1. From the **Storage** tab, select **Volume Groups**.
2. Click on the path you wish to test, then either right-click the path or select **Actions**.
3. Select **Test Selected Path**. The test can take up to two minutes, and will return the following results.
   - If the path passes the test, the Path test results box will appear and show a message stating "The test of the selected path was successful."
   - If the path fails the test, the Error box will appear and specify what is wrong with the path. After you click **OK**, the Path test results box will appear stating "The test of the selected path failed."

Repair Volume Group

You must repair a volume group if:

- You get an I/O error, the file system has shut down, and all data transfers result in the same I/O error.
- The file system is no longer visible from the share or mount point.
- A path has been repaired but still appears to be in a failed State.

To repair a volume group:

1. From the **Storage** tab, select **Volume Groups**.
2. Select the tree view.
3. Select the volume group to repair.
4. Select **Actions.**
   - — In a dedicated attach configuration, select **Repair Volume Group**.
   - — In an HA configuration, select **Restart Failover Package for Selected Volume Group**
5. Check the warning box and click **OK**.

As part of the repair process, CIFS and NFS connections may be disrupted. For a dedicated system, the volume groups are then activated. For an HA system, the package is stopped and then started again.

Reset LUN Paths to Factory Settings

1. From the **Storage** tab, select **Volume Groups**.
2. Select the volume group to reset.
3. Select **Actions > Reset LUN Paths to Factory Settings**. This will bring up the **Reset selected LUN Paths to factory settings** dialog box.
4. Read the warning, and accept it by checking the box next to the warning, and clicking **OK**.

Refresh the View

To refresh the view, select **Actions > Refresh**.

View Volume Group Information in Table View

From the **Storage** tab, select **Volume Groups**, then the View Volume Groups icon (first icon to the right of **Actions**) to use the table view.

The table view shows the following information for each volume group:

- Volume group name
- Total capacity (GB)
- Space allocated to file volume(s) and snapshot(s) (GB)
- Space available for file volume(s) snapshot(s) (GB)

The volume groups are listed alphabetically by volume group name. In this view, you can create, edit, and delete volume groups; reset the LUN paths to factory settings; and refresh the view.

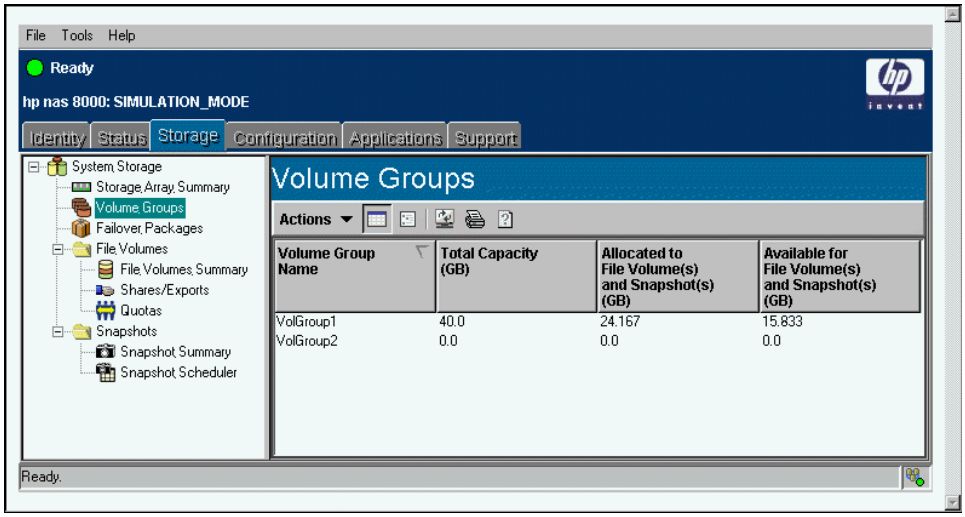


Figure 8: Viewing volume groups

Decide Whether to Manage the Data Paths

If each of your HBAs is using less than half of its capacity or if your HBAs bear about the same amount of traffic, it is best to continue using the default settings. However, in some situations, you could improve performance by changing the path settings. For example, there may be a high level of traffic on a particular LUN because it contains a database. From the Performance Monitor, you can see that a particular HBA has a high volume of traffic. Manage paths to make sure that this LUN has all optimal paths configured.

Manage the Data Paths

NAS Data Path Manager needs very little attention to function properly. However, to customize your paths to better meet your network and data transfer requirements, you will want or need to take action. These actions include:

- Add Hardware
- Remove Hardware
- Optimize Path Performance
- Troubleshoot Failed Paths
- Restore to Default Settings
- Recover from a Disaster

WARNING: These actions will temporarily disrupt all client connections to the volume group and its LUNs. NFS (UNIX) client operations will be temporarily delayed. CIFS (Windows) clients will be disconnected and will need to be reconnected.

To take any of the above actions, you must know how to perform the basic Data Path Manager tasks.

Learn to Perform Basic Data Path Manager Tasks

When customizing paths, you will need to perform some basic tasks in NAS Data Path Manager.

- Accept the Default Settings
- Assign a LUN to a storage array
- Take a path off-line or put it back on-line
- Change path behavior (from alternate to preferred or vice-versa)

Accept the Default Settings

When you scan for new storage, NAS Data Path Manager detects the new hardware and discovers the associated paths. The default configuration is assigned—optimal paths are designated as preferred paths; non-optimal paths are designated as alternate paths. Initially, it is best to accept the default settings by not making any changes.

To scan for new hardware from Command View NAS:

1. Select the **Storage** tab.
2. Select **Storage Array Summary**.
3. Select **Action > Scan for New Storage**.

Assign a LUN to a storage array

1. From the **Storage** tab, select **Storage Array Summary**.
2. Select the storage array to which you would like to add a LUN, or select a LUN within that array.
3. Select **Actions > Create New LUN**. This will launch the Create New LUN dialog box.
4. The first field provides the LUN number and defaults to the next available number. You can change it by selecting the correct number from the pull-down menu.
5. The second field provides the LUN Size (GB), and defaults to 100.0 GB. The information below the second field shows the available capacity for the LUN. To change the LUN size, enter the size you want into the field.
6. Click **OK** to save that information and return to the Storage Array Summary.

Take a path off-line or put it back on-line

1. From the **Storage** tab, select **Volume Groups**, and click the tree view ( ) icon.
2. Select either the LUN or the path you wish to change.
3. Select **Actions > Edit Paths for Selected LUN**, to bring up the **Edit LUN Path Configuration** dialog box.
4. Click the **Mode** box of the path you wish to change.
5. Select the appropriate mode (off-line or not), then click **OK**.

Change path behavior (from alternate to preferred or vice-versa)

1. From the **Storage** tab, select **Volume Groups**, and use the tree view (second icon to the right of **Actions**).
2. Select either the LUN or the path you wish to change.
3. Select **Actions > Edit Paths for Selected LUN**, to bring up the **Edit LUN Path Configuration** dialog box.

4. Click the **Mode** box of the path you wish to change.
5. Select the desired mode for the path (alternate or preferred) from the available options that appear, then click **OK**.

Add Hardware

After adding arrays or LUNs to your system, you can configure the paths to them. The recommended progression is as follows.

1. Accept the Default Settings.
2. Remove Hardware as described at on page 30.
3. Manage the Data Paths, if appropriate.

Continue making changes to your paths and monitoring performance until you achieve improved performance.

Remove Hardware

When you add, maintain, remove, or exchange hardware (such as switches or cables), you often know your paths will change. NAS Data Path Manager allows you to plan the interruption of the normal flow of operations in order to make the hardware change.

1. From the **Storage** tab, select **Volume Groups**, and use the tree view (second icon to the right of **Actions**) to view path information. (You can go to either the table view or tree view from the actions menu as well.)
2. Complete the hardware change.
3. Scan for new hardware, as discussed in the Accept the Default Settings section on page 29.
4. Restore the paths you set to off-line, according to the section on page 29.

Note: Accept the default configuration and monitor performance before making any changes to the path settings.

Optimize Path Performance

To improve network traffic across the paths, the most effective changes are to either change preferred paths to alternate, or change alternate paths to preferred.

1. For each LUN involved, select it, then make changes as described at Learn to Perform Basic Data Path Manager Tasks on page 28.
2. Monitor Data Paths as shown on page 17, to see the impact of the change.
3. Continue using this method until you achieve optimal system performance.

Troubleshoot Failed Paths

NAS Data Path Manager indicates a failure in several ways.

- You receive an alert in the Event Summary. From the **Status** tab, select **Event Summary** under **System Status**. Select the event, then open the Event Details Window by one of the following methods to view details of the appropriate alert.
  - Click on the Event Details icon ( ) next to **Actions**.
  - Right-click on the event listed under **Status**, then select **Event Details**.
  - Select **Actions > Event Details**.
- The failure is recorded in the **System Log**. From the **Support** tab, select **System Log** under **Diagnostics and Tools**. View the appropriate log entry.
- If Performance Monitor is enabled, the display for a failed HBA, or an HBA with failed paths, shows that there is no traffic to the HBA. From the **Tools** drop-down menu, select **Performance Monitor**. A new window will open. From the HP NAS 8000 Performance Monitor window, select **View > HBA Performance**, then the name of the HBA you wish to monitor.
- For preferred paths, the Volume Groups summary shows the status for that path as failed. From the **Storage** tab, select **Volume Groups**. View the summary as a tree by selecting the View Paths and LUNs for Volume Group icon (the second icon to the right of **Action**).

- For alternate (and preferred) paths, you can test a specific path from the Volume Groups summary page. From the **Storage** tab, select **Volume Groups**. Click on the path you wish to test, then either right-click the path or select **Actions**. Select **Test Selected Path**. The test can take up to two minutes, and will return the following results.
  - If the path passes the test, the Path test results box will appear and show a message stating "The test of the selected path was successful."
  - If the path fails the test, the Error box will appear and specify what is wrong with the path. After selecting **OK**, the Path test results box will appear stating "The test of the selected path failed."
- For paths that show as failed which have been repaired, you can test a specific path from the Volume Summary page. If the test of the path shows successful, you should attempt to repair the volume group.
  - In an stand-alone, dedicated NAS server and storage configuration, go to the **Storage** tab, select **Volume Groups**, then the volume group with the path that shows as failed. From the **Actions** menu select **Repair Volume Group**.
  - In an HA environment, from the **Storage** tab, select the volume group with the path that shows as failed. Select **Actions > Restart Failover Package for Selected Volume Group**.

There are several actions you can take if a path fails.

- Check your hardware to be sure the connection itself did not loosen or fail.
- If you have any unused alternate paths, change them to preferred paths using the steps described under Change Path Behavior on page 29.
- Remove paths to disk devices if you are unable to use the NAS server.

  There are limits for the number of paths you can have for each NAS server. You may have up to 256 total SCSI and SCSI fibre-channel paths per NAS server. A maximum of 32 paths can be used for tape drives, up to 128 can be assigned as disk paths to direct access LUNs, and any number of paths can be used for changers (taking into account the 256 total SCSI path maximum).

WARNING: You can have a total of 128 devices - a device is a combination of LUNs and paths. If you exceed the maximum 128 devices for the NAS Server, you will not be able to use the NAS Server until you remove (not just take off-line) as many paths to disk devices as necessary to equal no more than 128 devices.

Restore to Default Settings

If you have customized your preferred and alternate paths, but are not satisfied with the results, you can reset your data path management settings to the default settings at the volume group level.

To reset volume group paths to default settings:

1. From the **Storage** tab, select **Volume Groups**, and use the tree view (second icon to the right of **Actions**).
2. Select the LUN to reset.
3. Select **Actions > Reset LUN Paths to Factory Settings**. This will bring up the **Reset selected LUN Paths to factory settings** dialog box.
4. Read the warning, then accept it by checking the box next to the warning and selecting **OK**.

Recover from a Disaster

Performing disaster recovery for the NAS 8000 removes HP NAS Data Path Manager from the system. When disaster recovery is required, perform the following tasks.

1. Recover the NAS 8000 system using the instructions under Disaster Recovery in the hp StorageWorks NAS 8000 User's Guide.
2. Install NAS Data Path Manager, as discussed in the Install the Software section on page 15 of this guide.
3. Re-configure any customized path settings as described at Manage the Data Paths on page 28.

Text API Commands for NAS Data Path Manager

The text API commands documented here allow you to install NAS Data Path Manager, enable and disable the software package, reactivate volume groups, and restore data paths back to factory default settings. To perform other DPM functions, use the graphical user interface.

installSystemPackage cdrom://hpNasOs-DataPathManager-1.0-0.i386.rpm

Installs Data Path Manager add-on software module from the specified URL.

installSystemPackage
cdrom://hpNasOs-DataPathManager-authorize-1.0-0.i386.rpm

Authorizes Data Path Manager add-on software.

getStorageDsdiScsiLunList

Returns a list of LUNs that are being used in volume groups.

- outParam[0:N] = SCSI LUN name list

resetStorageDasdScsiLunCustomizedPaths

Restores the paths of the specified LUN back to factory default settings.

- inParam[ ] = LUN name

reactivateStorageVolumegroup

On a dedicated attach system, puts any volume group changes into effect.

- inParam[ ] = `Volume group name`

stopClusterPackage

On an HA system, use with `startClusterPackage` to put volume group changes into effect.

- inParam[ ]= Cluster package name

startClusterPackage

On an HA system, use after `stopClusterPackage` to put volume group changes into effect.

- inParam[ ]= Cluster package name

glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

Active state
A state in which a path is currently designated as a preferred or alternate path for data path management.

Alternate path
A path that is used for LUN access only after all preferred paths to the device have failed. Alternate paths are assigned by the software and are considered by the software to be non-optimal paths. You may also designate preferred paths as alternate paths.

Automatic failback
Following the failover of a LUN path from a failed path to another path, the LUN automatically returns to its original path when the path is restored.

Controller
The hardware device that facilitates communication between a host and one or more specified LUNs.

Controller failover
For EVAs and EMAs in multibus controller failover mode, when you have more than one controller, failover between the two controllers requires host intervention; it does not happen automatically.

Critical state
The condition of a system where there are no more available physical paths; the system is currently using the last available path for communication. Keep in mind that individual path failure (warning) is only reported when all paths have failed for an activated volume group (critical).

Failed state
A state that indicates that all redundant components have failed and the system is not operational. If you have an HA system and have set up package failover, associated packages have probably already failed over.

High Availability (HA)
HA systems are designed to avoid a loss of service during both planned and unplanned downtime. An HA system is based on clusters that have two NAS servers, a Quorum server, and storage that may come from either a dedicated storage configuration or a SAN. The NAS servers share access to the storage and provide failover capabilities for each other, but function as independent servers.

Host
The server that acts as a file server running the NAS 8000 software.

Host bus adapter (HBA)
A PCI or PCI-X card used to connect to SCSI or SCSI fibre-channel devices.

Load balancing
An algorithm that distributes data transfer across all preferred paths. The NAS 8000 uses a least-used algorithm for optimizing performance.

Logical Unit Number (LUN)
A physical or virtual storage device referred to as a logical unit. A logical Unit Number (LUN) is a value that identifies a specific logical unit with a target ID number.

Non-optimal path
Those data paths between an HBA and a specific LUN, evaluated by Data Path Manager and determined to be less efficient than others. By default, Data Path Manager will assign non-optimal paths as alternate paths—used for path failover.

Optimal path
Those data paths between an HBA and a specific LUN, evaluated by Data Path Manager and determined to more efficient than others. By default, Data Path Manager will assign optimal paths as preferred paths—used for path load balancing between the HBA and LUN.

Off-line
The state of a path that has been removed from service by failure or by being taken off-line manually. If a path is taken off-line, it reverts to its previous mode when it is brought back on-line.

Preferred path
Preferred paths are those data paths between an HBA and a specific LUN, evaluated by Data Path Manager and determined to be optimal paths. Preferred paths are used for path load balancing between the HBA and LUN.

WWN
The World Wide Name of a device. A WWN is a unique alpha-numeric identifier for hardware. When Data Path Manager is enabled, each initiator (HBA) and target (controller) is identified by a world wide name (WWN) in the Volume Groups table.

index

A

allocate space 26
alternate 9, 14, 23, 29, 30, 31, 33
arrays 9, 12, 29, 30
assign a LUN 29
audience 5
authorized reseller, HP 7
automatic 13

C

change 29
CIFS 28
CIFS connection 25
command line interface 15, 33
configuration drawing 15
connection
  CIFS 25
  NFS 25
conventions
  document 6
create volume group 24
customize 28
customize paths 28

D

data paths 12, 13, 17, 30
  failover 9, 14
  manage 27
default 17, 30, 33
  settings 28
delete volume group 25
device limits 31
disable 14, 15
disaster recovery 33
disrupt 25, 28
document
  conventions 6
  prerequisites 5
  related documentation 5

E

edit volume group 24
enable 15, 17
error
  I/O 25
event 13

F

factory settings 26
failed 25
failover packages 9
  restart 25
failure
  data path 13, 14
  repair 13
fibre-channel 10

G

getting help 6

H

hardware
  add 30
  change 30

failure 31
new 30
remove 30
scan for 30
help, obtaining 6
HP
authorized reseller 7
storage website 7
technical support 6

I

initiator 12
install 9, 10, 15

L

limit, devices 31
load balancing 9, 13
log 31
login 15
LUN
allocate 24
assign 29
edit paths 29
path 29
reset 26
traffic 27

M

manage 27, 28
mode 29
modes 17

N

NFS 28
NFS connection 25
node 21, 26
non-optimal 9, 30

O

off-line 23, 29
on-line 23, 29
optimal 9, 30, 31
optimize 31

P

password 15
path
behavior 29
customize 28
edit 29
information 21, 26
initiator 21, 26
mode 23
repair 25
state 21, 23, 26
target 21, 26
test 25
performance 30, 31
policy 13
preferred 9, 23, 29
prerequisites 5

R

recover from a disaster 33
refresh 26
related documentation 5
repair 13
repair path 25
repair volume group 31
requirements, system 10
reset LUN paths 26
restore paths 14
restore to default 33

S

scan for new storage 28
settings
default 26, 28
factory 26
snapshots 26
state 21, 25, 26
status 17

storage 9, 10, 30
system requirements 10
system status 31

T

target 12
technical support, HP 6
Test Selected Path 23, 25, 31
traffic 27
troubleshooting 31

V

volume group
  create new 24
  delete 25
  edit 24
  information 21, 26

W

websites
  HP storage 7
world wide name 21, 26